In re Patent Application of
JOET ET AL.
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In the Claims:

Claims 1-11 (Cancelled).

12. (New) A method for generating a signal with a frequency equal to a product of a reference frequency and a real number, the method comprising:

performing a sequence of measurement phases and correction phases;

the measurement phase comprising

providing an output signal from an oscillator,

performing a first integer division of a frequency of the output signal by a first integer divider to obtain a first intermediate signal,

determining a first measurement signal representative of a time difference between the first intermediate signal and a reference signal having the reference frequency,

generating a first comparison signal derived from the first measurement signal,

generating a second comparison signal dependent on a period of the reference signal, on integer and decimal parts of the real number and on the first integer divider,.

comparing the first and second comparison signals to obtain an error signal representative of a time difference between a period of the output signal and the period of the reference signal, and

the comparison phase comprising deactivating the first integer division to determine and deliver the error signal to the oscillator, with the output signal from the oscillator forming the desired signal with a frequency equal

to the product of the reference frequency and the real number.

13. (New) A method according to Claim 12, wherein the measurement phase takes place during an integer number of periods of the reference signal, and the correction phase takes place during another integer number of periods of the reference signal.

14. (New) A method according to Claim 12, wherein generating the second comparison signal comprises:

performing a second integer division of the frequency of the output signal by a second integer divider to obtain a second intermediate signal;

determining a second measurement signal representative of a time difference between the second intermediate signal and the reference signal; and

weighting the second intermediate signal by a second weighting factor obtained from the first integer divider and the integer and decimal parts of the real number.

15. (New) A method according to Claim 14, wherein generating the first comparison signal comprising weighting the first measurement signal by a first weighting factor obtained from the second integer divider, and from the integer and decimal parts of the real number; and wherein the correction phase further comprises deactivating the second integer division.

16. (New) A method according to Claim 14, wherein the first integer divider is equal to N+1, with N being the integer part of the real number; wherein the second integer

divider is equal to N-1; wherein the first weighting factor is equal to 1+f, where f is the decimal part of the real number; and wherein the second weighting factor is equal to 1-f.

17. (New) A method for generating a signal comprising:

providing an output signal from an oscillator;

performing a first integer division of a frequency of the output signal by a first integer divider to obtain a first intermediate signal;

determining a first measurement signal representative of a time difference between the first intermediate signal and a reference signal having the reference frequency;

generating a first comparison signal derived from the first measurement signal;

generating a second comparison signal dependent on a period of the reference signal, on integer and decimal parts of the real number and on the first integer divider;

comparing the first and second comparison signals to obtain an error signal representative of a time difference between a period of the output signal and the period of the reference signal; and

deactivating the first integer division to determine and deliver the error signal to the oscillator, with the output signal from the oscillator forming the desired signal with a frequency equal to the product of the reference frequency and the real number.

18. (New) A method according to Claim 17, wherein the providing, the performing, the determining, the generating

and the comparing are performed during an integer number of periods of the reference signal, and wherein the deactivating is performed during another integer number of periods of the reference signal.

19. (New) A method according to Claim 17, wherein generating the second comparison signal comprises:

performing a second integer division of the frequency of the output signal by a second integer divider to obtain a second intermediate signal;

determining a second measurement signal representative of a time difference between the second intermediate signal and the reference signal; and

weighting the second intermediate signal by a second weighting factor obtained from the first integer divider and the integer and decimal parts of the real number.

20. (New) A method according to Claim 19, wherein generating the first comparison signal comprising weighting the first measurement signal by a first weighting factor obtained from the second integer divider, and from the integer and decimal parts of the real number; and further comprising deactivating the second integer division.

21. (New) A method according to Claim 19, wherein the first integer divider is equal to N+1, with N being the integer part of the real number; wherein the second integer divider is equal to N-1; wherein the first weighting factor is equal to 1+f, where f is the decimal part of the real number; and wherein the second weighting factor is equal to 1-f.

22. (New) A device for generating a signal with a frequency equal to a product of a reference frequency and a real number, the device comprising:

a controlled oscillator for providing an output signal;

first division means for performing a first integer division of a frequency of the output signal by a first integer divider to obtain a first intermediate signal;

first determination means for determining a first measurement signal representative of a time difference between the first intermediate signal and a reference signal having the reference frequency;

first generation means for generating a first comparison signal derived from the first measurement signal;

second generation means for generating a second comparison signal dependent on a period of the reference signal, integer and decimal parts of the real number and the first integer divider;

comparison means for comparing the first and second comparison signals to obtain an error signal representative of a time difference between a period of a current output signal and the period of the reference signal;

a switch connected between an output of said comparison means and an input of said controlled oscillator; and

control means for opening and closing said switch and deactivating said first division means when said switch is closed to determine the error signal and to deliver the error signal to the input of said controlled oscillator, with the output signal from said controlled oscillator forming the desired signal with a frequency equal to the product of the

reference frequency and the real number.

23. (New) A device according to Claim 22, wherein said control means open and close said switch during successive periods of the reference signal.

24. (New) A device according to Claim 22, wherein said second generation means comprise:

a second divider for performing a second integer division of the frequency of the output signal by a second integer divider to obtain a second intermediate signal;

second determination means for determining a second measurement signal representative of a time difference between the second intermediate signal and the reference signal; and

second weighting means for weighting the second intermediate signal by a second weighting factor obtained from the first integer divider and from the integer and decimal parts of the real number.

25. (New) A device according to Claim 24, wherein said first generation means comprise first weighting means for weighting the first measurement signal by a first weighting factor obtained from the second integer divider, and from the integer and decimal parts of the real number; and wherein said control means also deactivates said second division means when said switch is closed.

26. (New) A device according to Claim 24, wherein the first integer divider is equal to N+1, where N is the integer part of the real number; wherein the second integer divider is equal to N-1; wherein the first weighting factor is

equal to 1+f, where f is the decimal part of the real number; and wherein the second weighting factor is equal to 1-f.

27. (New) A device according to Claim 22, wherein said controlled oscillator, said first division means, said first determination means, said first and second generation means, said comparison means, said switch and said control means are formed as an integrated circuit.

28. (New) A frequency tuning device comprising:

an oscillator for providing an output signal;

a first division circuit for performing a first integer division of a frequency of the output signal by a first integer divider to obtain a first intermediate signal;

a first determination circuit for determining a first measurement signal representative of a time difference between the first intermediate signal and a reference signal having the reference frequency;

a first generation circuit for generating a first comparison signal derived from the first measurement signal;

a second generation circuit for generating a second comparison signal dependent on a period of the reference signal, integer and decimal parts of the real number and the first integer divider;

a comparison circuit for comparing the first and second comparison signals to obtain an error signal representative of a time difference between a period of a current output signal and the period of the reference signal;

a switch connected between an output of said comparison circuit and an input of said controlled oscillator;

and

a control circuit for opening and closing said switch and deactivating said first division circuit when said switch is closed to determine the error signal and to deliver the error signal to the input of said controlled oscillator, with the output signal from said controlled oscillator forming the desired signal with a frequency equal to a product of the reference frequency and the real number.

29. (New) A frequency tuning device according to Claim 28, wherein said control circuit opens and closes said switch during successive periods of the reference signal.

30. (New) A frequency tuning device according to Claim 28, wherein said second generation circuit comprises:

a second divider for performing a second integer division of the frequency of the output signal by a second integer divider to obtain a second intermediate signal;

a second determination circuit for determining a second measurement signal representative of a time difference between the second intermediate signal and the reference signal; and

a second weighting circuit for weighting the second intermediate signal by a second weighting factor obtained from the first integer divider and from the integer and decimal parts of the real number.

31. (New) A frequency tuning device according to Claim 30, wherein said first generation circuit comprises a first weighting circuit for weighting the first measurement signal by a first weighting factor obtained from the second

integer divider, and from the integer and decimal parts of the real number; and wherein said control circuit also deactivates said second division circuit when said switch is closed.

32. (New) A frequency tuning device according to Claim 30, wherein the first integer divider is equal to N+1, where N is the integer part of the real number; wherein the second integer divider is equal to N-1; wherein the first weighting factor is equal to 1+f, where f is the decimal part of the real number; and wherein the second weighting factor is equal to 1-f.

33. (New) A frequency tuning device according to Claim 28, wherein said controlled oscillator, said first division circuit, said first determination circuit, said first and second generation circuits, said comparison circuit, said switch and said control circuit are formed as an integrated circuit.

34. (New) A terminal of a wireless communication system comprising:

an antenna;

an analog stage connected to said antenna;

a reception processing stage connected to said analog stage and providing a reference signal; and

a frequency tuning device connected to said analog stage and to said reception stage, said frequency tuning circuit comprising

a controlled oscillator for providing an output signal to said analog stage,

a first division circuit for performing a first

integer division of a frequency of the output signal by a first integer divider to obtain a first intermediate signal,

a first determination circuit for determining a first measurement signal representative of a time difference between the first intermediate signal and the reference signal having a reference frequency,

a first generation circuit for generating a first comparison signal derived from the first measurement signal,

a second generation circuit for generating a second comparison signal dependent on a period of the reference signal, on integer and decimal parts of the real number and on the first integer divider,

a comparison circuit for comparing the first and second comparison signals to obtain an error signal representative of a time difference between a period of a current output signal and the period of the reference signal,

a switch connected between an output of said comparison circuit and an input of said controlled oscillator, and

a control circuit for opening and closing said switch and deactivating said first division circuit when said switch is closed to determine the error signal and to deliver the error signal to the input of said controlled oscillator, with the output signal from said oscillator forming the desired signal with a frequency equal to the product of the reference frequency and the real number.

35. (New) A terminal according to Claim 35, wherein said control circuit opens and closes said switch during successive periods of the reference signal.

36. (New) A terminal according to Claim 35, wherein said second generation circuit comprises:

a second divider for performing a second integer division of the frequency of the output signal by a second integer divider to obtain a second intermediate signal;

a second determination circuit for determining a second measurement signal representative of a time difference between the second intermediate signal and the reference signal; and

a second weighting circuit for weighting the second intermediate signal by a second weighting factor obtained from the first integer divider and from the integer and decimal parts of the real number.

37. (New) A terminal according to Claim 36, wherein said first generation circuit comprises a first weighting circuit for weighting the first measurement signal by a first weighting factor obtained from the second integer divider, and from the integer and decimal parts of the real number; and wherein said control circuit also deactivates said second division circuit when said switch is closed.

38. (New) A terminal according to Claim 36, wherein the first integer divider is equal to N+1, where N is the integer part of the real number; wherein the second integer divider is equal to N-1; wherein the first weighting factor is equal to 1+f, where f is the decimal part of the real number;

and wherein the second weighting factor is equal to 1-f.

39. (New) A terminal according to Claim 35, wherein said controlled oscillator, said first division circuit, said first determination circuit, said first and second generation circuits, said comparison circuit, said switch and said control circuit are formed as an integrated circuit.

40. (New) A terminal according to Claim 35, wherein the terminal is configured as a mobile cell phone.